

ONTARIO MINISTRY OF ENVIRONMENT

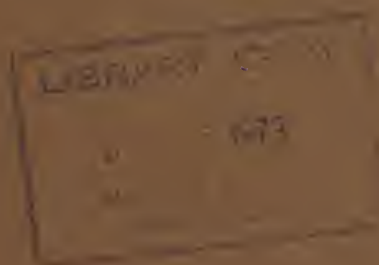


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## OPERATING SUMMARY

TD  
367  
.A56  
C44  
1972  
MOE

# CHATHAM



LABORATORY & RESEARCH LIBRARY  
MINISTRY OF THE ENVIRONMENT

# 1972

TB  
257  
C413  
1137  
1072  
110E

023d

MINISTRY OF THE ENVIRONMENT

MINISTER

Honourable James A.C. Auld

DEPUTY MINISTER

E. Biggs

ASSISTANT DEPUTY MINISTER

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REGIONAL SUPERVISOR

P.J. Osmond

OPERATIONS ENGINEER

R.E. Brown

135 St. Clair Avenue West

Toronto 195

CHATHAM  
WATER POLLUTION CONTROL PLANT

operated for

THE CITY OF CHATHAM

by the

MINISTRY OF THE ENVIRONMENT

1972 ANNUAL OPERATING SUMMARY



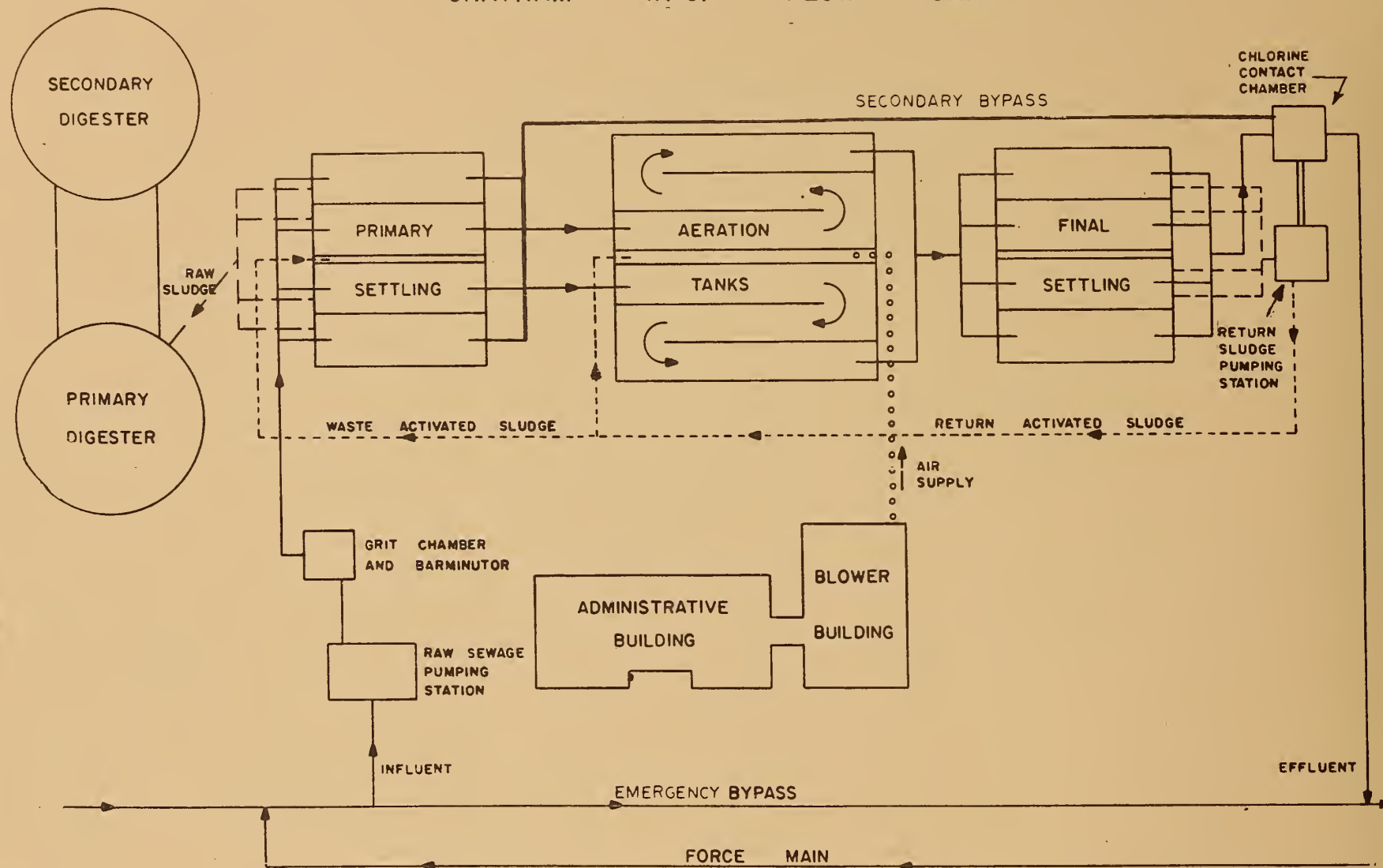
Environment Ontario  
Lambton County  
Water Pollution Control  
Chatham, Ontario N6P 5Y6  
Canada



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# CHATHAM WPCP FLOW CHART



# DESIGN DATA

PROJECT NO. 2-0102-62

TREATMENT Activated Sludge

DESIGN FLOW 4.5 mgd

DESIGN POPULATION 45,000

BOD - Raw Sewage 250 mg/l  
- Removal 90%

SS - Raw Sewage 250 mg/l  
- Removal 90%

## RAW SEWAGE

### Screening

- One manually-cleaned bar screen

### Pumps

Type: Worthington  
Size: Three 3750 gpm @ 47' tdh  
One 3750 gpm @ 47' tdh  
(electric & standby diesel)

## PRIMARY TREATMENT

### Grit Removal

Type: Aerated, with clamshell bucket  
Size: One 27' x 14' x 11 2/3 (avg)  
(27,450 gal)  
Retention: 8.8 min  
Air Supply: One Sutorbilt

### Comminution

Type: Barminutor  
Size: Two model C

## Primary Sedimentation

Type: Jeffrey, two-pass  
Size: Two 80' x 32' x 12' (avg)  
(382,000 gal)  
Retention: 2.05 hr  
Loading: Surface, 878 gal/ft<sup>2</sup>/day  
Weir, 9400 gal/ft/day

## SECONDARY TREATMENT

### Aeration Tanks

Type: Diffused air; triple pass  
Size: Two 130' x 63' x 14'  
(1.43 mil gal)  
Retention: 7.6 hr

### Diffusers

Type: Schumacher tubes  
125 per pass on 12" centres

### Air Supply

Type: Sutorbilt  
Size: Three 2500 cfm

## Secondary Sedimentation

Type: Jeffrey  
Size: Two 120' x 32' x 12' (avg)  
(574,000 gal)  
Retention: 3.08 hours  
Loading: Surface, 586 gal/ft<sup>2</sup>/day  
Weir, 8780 gal/ft/day

## CHLORINATION

Type: F & P  
Size: One 2000 lb/day  
One 400 lb/day

## Chlorine Contact Chamber

Size: One 33.6' x 30' x 10' (62,300 gal)  
Retention: 22 min

## OUTFALL

- 1,025' to Thames River

## SLUDGE HANDLING

Digestion System - Two-stage  
Primary--

Type: Gas mixed, fixed cover  
Size: One 65' dia x 25' (83,000 cu ft  
or 0.52 mil gal)

Secondary--

Type: Fixed cover  
Size: One 65' dia x 25' (82,000 cu ft  
or 0.51 mil gal)



## GENERAL

This project consists of a sewage treatment system, sewage pumping stations and a sewer system. The plant employs the activated sludge process with 2 stage anaerobic sludge digestion, and is designed for a hydraulic loading of 4.5 mgd and an organic loading of 11,250 pounds of BOD and suspended solids per day. Fourteen pumping stations, two of them located on the plant site, are operated by plant staff. Of the 14 stations, two are storm water stations and three are sewage stations, owned by the City and operated by the Ministry.

The plant occupies six acres of a seventy-six acre plot in the west end of Chatham, downstream and upwind of the City. A total of 34.5 acres have been used to build a six cell aerated lagoon system designed for the treatment of canning wastes.

## EXPENDITURES

The operating cost for the complete project for 1971 was \$205,305.09 which represents an increase of 6.3 percent over 1971. Costs rose mainly due to increases in salaries and sludge haulage. Based on the analyses of raw sewage entering the plant, the cost per million gallons of sewage treated was \$132.00 and the cost per pound of BOD removed was 7.86 cents. The cost per million gallons dropped substantially from 1971 due to the increase in volume of sewage treated.

## PLANT FLOWS

The total gallonage treated in 1972 was 1557 million gallons. The plant operated at 95 percent of hydraulic capacity over the year, at 124 percent during the peak month and at 218 percent during the peak day. During period of heavy precipitation, flow in excess of the secondary treatment capacity received only primary treatment.

During August and September approximately 1 mgd of waste from canning factories was treated in the plant with the remaining cannery waste processed in the aerated lagoons.



A statistical analysis of the flow records indicates that the design capacity of the plant was exceeded during 40 percent of 1972.

#### PLANT EFFICIENCY

Based on available sampling data, the average BOD and suspended solids concentrations in the raw sewage were 182 mg/l and 263 mg/l respectively. The average BOD and suspended solids loading was 7,750 and 11,200 pounds per day respectively. The BOD and suspended solids loading for the maximum month was 11,800 and 14,500 pounds per day respectively.

Final effluent BOD and suspended solids concentrations averaged 12 mg/l and 10 mg/l respectively, which represent BOD and suspended solids reductions of 93 and 96 percent. The final effluent BOD and suspended solids concentrations met the Ministry objectives approximately 73 and 82 percent of the time respectively. This represents an improvement over 1971 despite the fact that the hydraulic, BOD and suspended solids loadings in 1972 were greater than in 1971.

Plant efficiency continued to be adversely affected in 1972 by high storm water flows and illegal industrial waste discharges. Among the industrial waste problems encountered were odours from bean processing at Libby, McNeil and Libby Limited, extreme pH levels from bean and tomatoe processing at Libbys, and from a phosphoric acid spill at Daymond Limited, oil from a fuel leak at North American Rockwell Limited and from an equipment failure at Motor Wheel Corporation of Canada Limited. High suspended solids were received from poultry processing at Pinecrest Foods Limited.

A total of 4583 cubic feet of grit was removed. This represents a removal of 2.9 cubic feet per million gallons which is normal for this type of system. The high grit removals in September and October were due to the large quantities of seeds from tomato processing.

## SLUDGE DIGESTION AND DISPOSAL

The primary digester was drained in June to remove grit that had accumulated since the digester was put into operation in 1964. The work was undertaken to improve the efficiency of the digester and reduce the quantity of sludge to be hauled. The primary was out of operation for about three weeks. The resulting 50 percent reduction in digester capacity caused relatively poor sludge digestion during June and July.

A total of 9.67 million gallons of raw sludge was pumped to the digesters and 6.43 million gallons of digested sludge was removed representing a 33.5 percent reduction in sludge volume. The percent reduction is considerably less than in 1971. This may partially be due to normal start-up problems with the primary digester.

Ultimate disposal of the digested sludge was carried out primarily by dumping at a sanitary land fill site in Harwich Township.

## AERATION

The average BOD entering the aeration section was 121 mg/l and the average MLSS was 2520 mg/l, resulting in an average loading of .14 pounds of BOD per day per pound of MLSS. An average of 2000 cubic feet of air was supplied per pound of BOD removed.

## CHLORINATION

The final effluent was chlorinated from May 15 to October 26. A total of 31,900 pounds of chlorine was used at an average dosage of 5.0 milligrams per litre to obtain a residual of 0.5 mg/l in the final effluent.

## CONCLUSIONS

During 1972 average hydraulic and suspended solids loadings at the Chatham treatment plant were approximately equal to design capacity. Average BOD loading was within design capacity but exceeded design capacity during the peak month. The increase in loadings has reversed the trend of the previous two years and re-affirms the need for an expansion of the treatment plant facilities. It is recommended that a consulting engineer be commissioned to prepare a report on plant expansion requirements.

Despite the high loadings on the treatment plant the average effluent quality remained within the standards set by the Ministry.

Illegal industrial waste discharges continued to create serious operating problems during the year.

Increasing sludge haulage costs and problems with ultimate disposal of this material have indicated the need for sludge dewatering facilities. These facilities reduce the volume of the sludge leaving the plant and enable storage of the sludge at the plant when adverse weather conditions would interfere with disposal on agricultural land.

# PROJECT COSTS

2-0102-62 - STAGE I NET CAPITAL COST	\$2, 615, 831.27
DEDUCT - Portion financed by CMHC (Final)	<u>(1, 845, 135.13)</u>
Long Term Debt to MOE	\$ <u>770, 696.14</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	\$ <u>140, 257.39</u>
Net Operating	\$ 205, 305.09
Debt Retirement	8, 577.00
Reserve	5, 165.42
Interest Charged	<u>43, 219.84</u>
TOTAL	\$ <u>262, 267.35</u>

## RESERVE ACCOUNT

Balance @ January 1, 1972	\$ 39, 949.53
Deposited by Municipality	5, 165.42
Interest Earned	<u>2, 648.69</u>
	\$ 47, 763.64
Less Expenditures	<u>9, 413.01</u>
Balance @ December 31, 1972	\$ <u>38, 350.63</u>

# PROJECT COSTS

2-0102-62 STAGE II NET CAPITAL COST	\$813,322.12
DEDUCT - Portion financed by CMHC (Final)	<u>(504,317.16)</u>
Long Term Debt to MOE	<u>\$309,004.96</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	\$ <u>46,735.06</u>
Net Operating	\$
Debt Retirement	3,678.00
Reserve	2,052.02
Interest Charged	<u>17,328.68</u>
TOTAL	\$ <u>23,058.70</u>

## RESERVE ACCOUNT

Balance @ January 1, 1972	\$ 18,362.99
Deposited by Municipality	2,052.02
Interest Earned	<u>1,229.47</u>
	\$ 21,644.48
Less Expenditures	<u>-</u>
Balance @ December 31, 1972	\$ <u>21,644.48</u>

# PROJECT COSTS

2-0102-62 STAGE III  
NET CAPITAL COST \$1, 079, 015. 80

DEDUCT - Portion financed by  
CMHC (Final) (733, 301. 54)

Long Term Debt to MOE \$ 345, 714. 26

Debt Retirement Balance at Credit  
(Sinking Fund) December 31, 1972 \$ 47, 779. 15

Net Operating \$  
Debt Retirement 4, 430. 00  
Reserve 1, 609. 33  
Interest Charged 19, 387. 30

TOTAL \$ 25, 426. 63

## RESERVE ACCOUNT

Balance @ January 1, 1972 \$ 11, 659. 54

Deposited by Municipality 1, 609. 33

Interest Earned 788. 43

\$ 14, 057. 30

Less Expenditures -

Balance @ December 31, 1972 \$ 14, 057. 30



# PROJECT COSTS

2-0102-62 STAGE IV NET CAPITAL COST	\$593, 292. 79
DEDUCT - Portion financed by CMHC (Final)	<u>(357, 876. 24)</u>
Long Term Debt to MOE	<u>\$235, 416. 55</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	\$ <u>23, 703. 43</u>
Net Operating	\$
Debt Retirement	3, 311. 00
Reserve	2, 881. 92
Interest Charged	<u>13, 201. 91</u>
TOTAL	\$ <u>19, 394. 83</u>

## RESERVE ACCOUNT

Balance @ January 1, 1972	\$ 15, 343. 56
Deposited by Municipality	2, 881. 92
Interest Earned	<u>1, 057. 12</u>
	\$ 19, 282. 60
Less Expenditures	<u>-</u>
Balance @ December 31, 1972	\$ <u>19, 282. 60</u>



## PROJECT COSTS

2-0102-62 SPECIAL OPERATING AGREEMENT "A"  
NET CAPITAL COST

DEDUCT - Portion financed by

Long Term Debt to MOE

Debt Retirement Balance at Credit  
(Sinking Fund) December 31, 1972

Net Operating	
Debt Retirement	
Reserve	\$ 254.18
Interest Charged	<u>          </u>
TOTAL	\$ <u>254.18</u>

### RESERVE ACCOUNT

Balance @ January 1, 1972	\$1, 913.62
Deposited by Municipality	254.18
Interest Earned	<u>129.15</u>
	\$2, 296.95
Less Expenditures	<u>          </u>
Balance @ December 31, 1972	<u>\$2, 296.95</u>

## PROJECT COSTS

2-0102-62 SPECIAL OPERATING AGREEMENT 'B'  
NET CAPITAL COST

DEDUCT - Portion financed by

Long Term Debt to MOE

Debt Retirement Balance at Credit  
(Sinking Fund) December 31, 1972

Net Operating	
Debt Retirement	
Reserve	\$ 352.74
Interest Charged	<u>          </u>
TOTAL	\$ <u>352.74</u>

### RESERVE ACCOUNT

Balance @ January 1, 1972	\$ 974.26
Deposited by Municipality	352.74
Interest Earned	<u>71.51</u>
	\$1, 398.51
Less Expenditures	<u>          </u>
Balance @ December 31, 1972	<u><u>\$1, 398.51</u></u>

## OPERATING COSTS

# 1972 COSTS

● PAYROLL	48 %
● FUEL	1 %
● POWER	22 %
● CHEMICALS	< 1 %
● GENERAL SUPPLIES	3 %
● EQUIPMENT	< 1 %
● REPAIRS & MAINTENANCE	4 %
● SUNDRY	20 %
● WATER	1 %
● TRAVEL	< 1 %

## TOTAL ANNUAL COST

NET OPERATING	62 %
DEBT RETIREMENT	6 %
RESERVE	4 %
INTEREST	28 %

## YEARLY OPERATING COSTS

YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	TREATMENT COSTS	
			\$ per million gal	¢ per lb BOD
1968	1380.4	137,296.11	99.46	4 cents
1969	1494.0	149,745.68	100.23	4 cents
1970	1355.0	153,786.75	117.19	5 cents
1971	1214.4	193,158.61	159.10	8 cents
1972	1557.7	205,305.09	131.80	8 cents

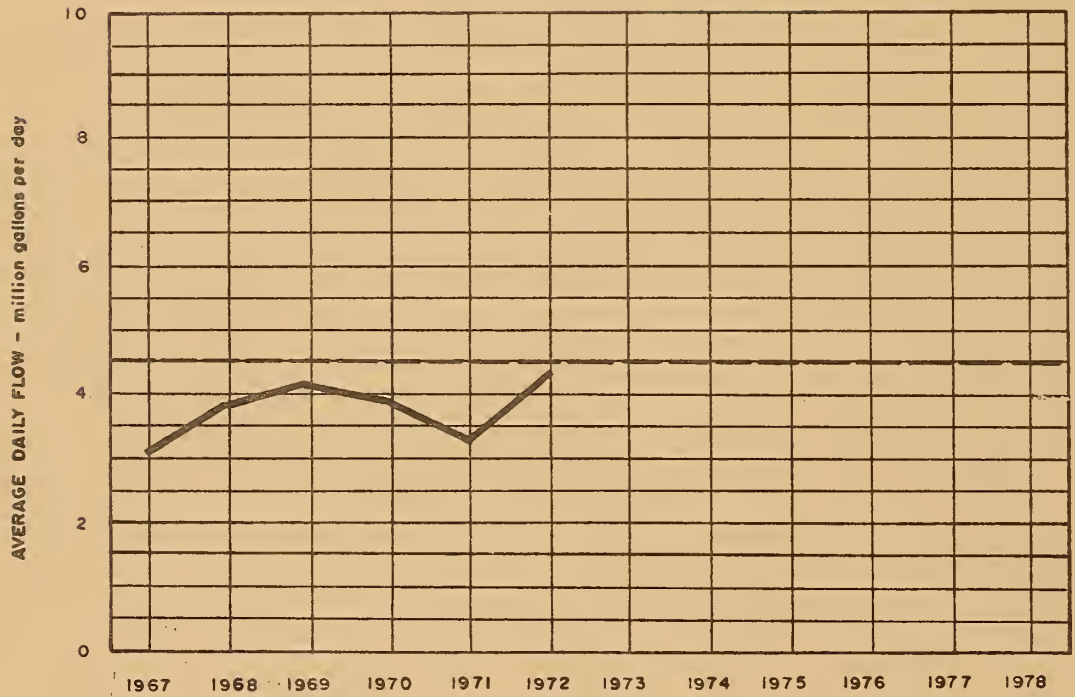
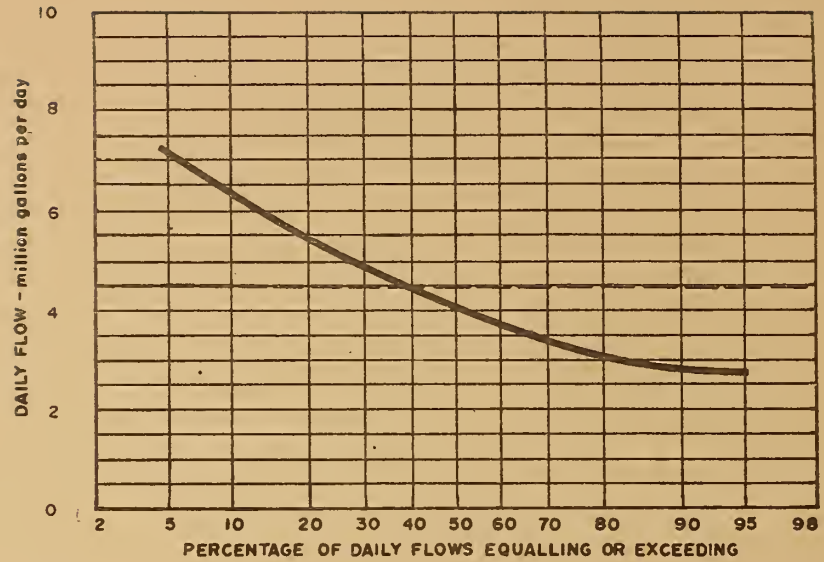
## MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	REGULAR PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY*	WATER	TRAVEL
JAN	11909.00	7286.30			175.98		93.37	44.80	50.56	4257.99		
FEB	14206.45	7677.68		273.87	3095.51		665.27	450.00	1747.21	296.91		
MAR	19718.86	7411.40		281.38	3048.60		439.64	262.64	851.55	6662.39	673.69	87.57
APR	14586.03	7874.97		11.58	3200.28		263.80		176.26	3059.14		
MAY	11304.89	5093.82		348.66	3744.77		(23.81)	(990.55)	418.82	2688.33		24.85
JUNE	16239.61	10240.78		122.92	3667.18		964.61		425.20	217.98	600.94	
JULY	10027.95	199.05		45.47	3031.51		592.25	230.33	1403.98	4498.46		26.90
AUG	17231.28	7606.43		98.95	3459.72		518.33	4.03	394.79	4038.63	1110.40	
SEPT	18754.80	8022.25		114.08	4490.64	1369.20	146.00	94.50	226.48	4291.65		
OCT	16736.19	8728.84		31.18	3934.39		549.44	195.95	209.09	3087.30		
NOV	7838.17	408.67			4168.12		342.13		439.69	1772.17	707.39	
DEC	46751.86	28941.19		159.05	9481.36		1053.38		1554.60	5490.08		72.20
TOTAL	205305.09	99491.38		1487.14	45498.06	1369.20	5604.41	291.70	7898.23	40361.03	3092.42	211.52

Brackets indicate credit.

\* Sundry includes sludge haulage costs of \$40,923.31

# PROCESS DATA FLOWS



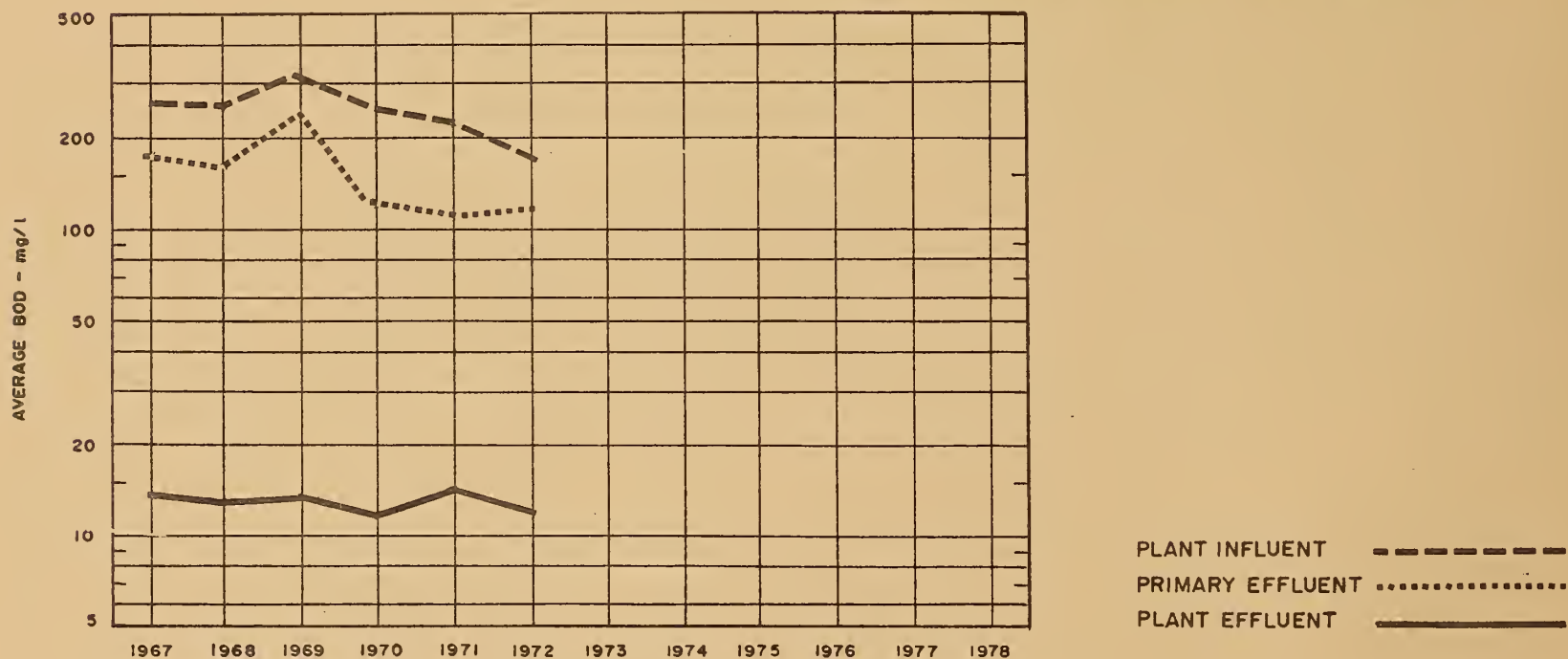
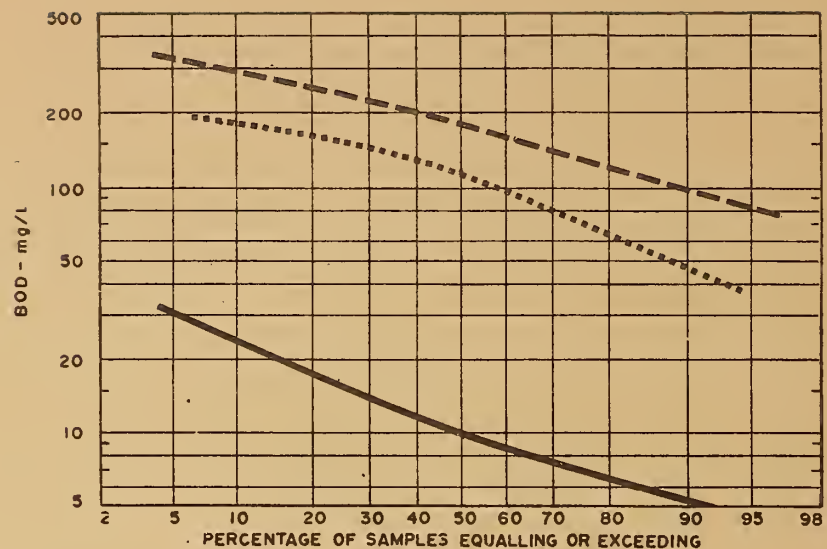
DESIGN CAPACITY - - - - -



# PLANT PERFORMANCE

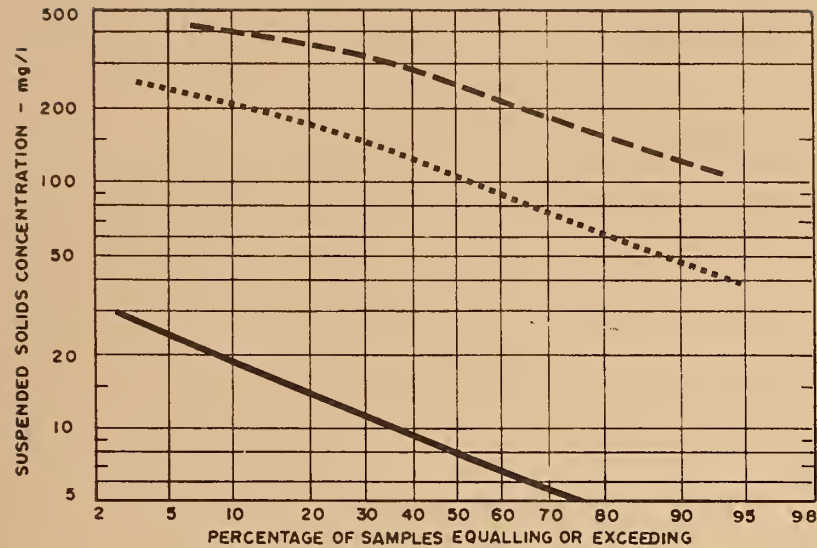
MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10 <sup>3</sup> pounds	mg/l	mg/l	%	10 <sup>3</sup> pounds	mg/l P	mg/l P
JAN	102.8	3.3	4.6	177	26	85	155	245	16	83	235	-	-
FEB	95.8	3.3	4.9	218	22	90	188	296	25	92	260	9.0	.8
MAR	138.6	4.5	8.9	204	15	93	261	258	14	95	338	9.0	4.5
APR	155.0	5.2	9.4	126	12	90	177	224	11	95	330	5.5	3.2
MAY	126.4	4.1	6.3	115	15	87	126	258	8	97	316	17.0	6.6
JUNE	119.0	4.0	6.5	244	10	96	278	277	7	97	321		
JULY	113.5	3.7	4.9	147	8	95	158	240	5	98	267	16.0	4.7
AUG	109.8	3.5	5.0	139	5	96	147	307	4	99	333	14.0	4.6
SEPT	166.6	5.6	8.8	188	7	96	302	260	4	98	426	20.0	1.4
OCT	140.7	4.5	7.3	198	3	98	274	303	5	98	419	7.0	.9
NOV	134.5	4.5	9.3	264	7	97	345	284	11	96	367	28.0	3.2
DEC	156.0	5.0	9.8	136	7	95	200	179	9	95	263	18.0	5.1
TOTAL	1557.7	-	-	-	-	-	2611	-	-	-	3875	-	-
AVG.	-	4.3	MAXIMUM 9.8	182	12	93	217	263	10	96	323	14.3	3.5
No. of Samples	-	-	-	79	78	-	-	243	250	-	-	10	10

# BIOCHEMICAL OXYGEN DEMAND

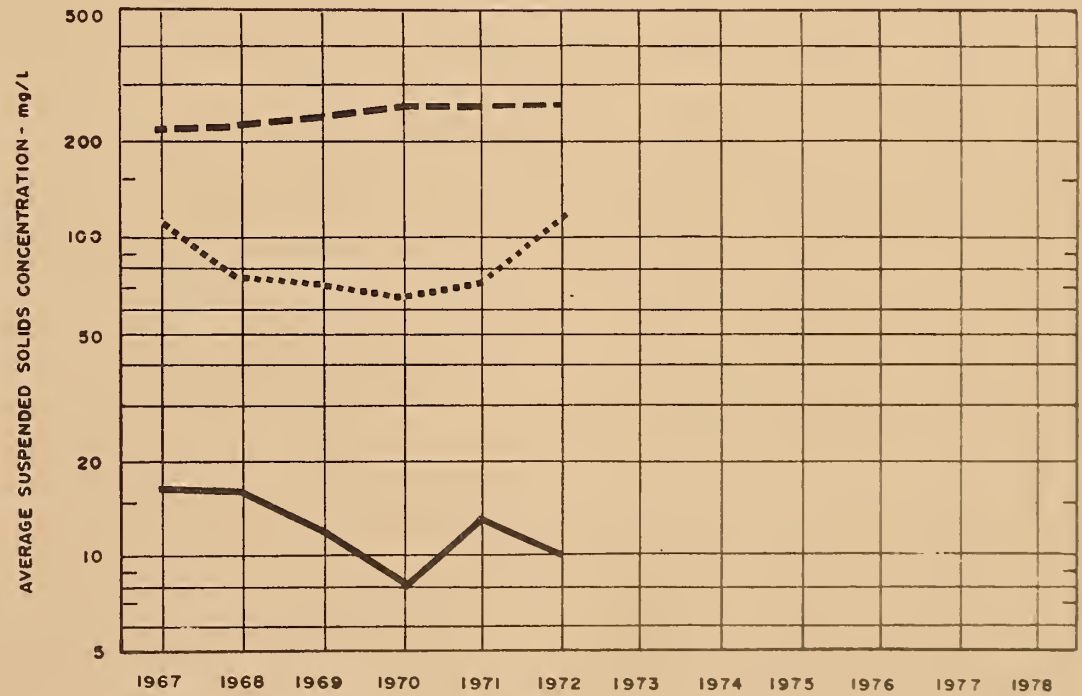




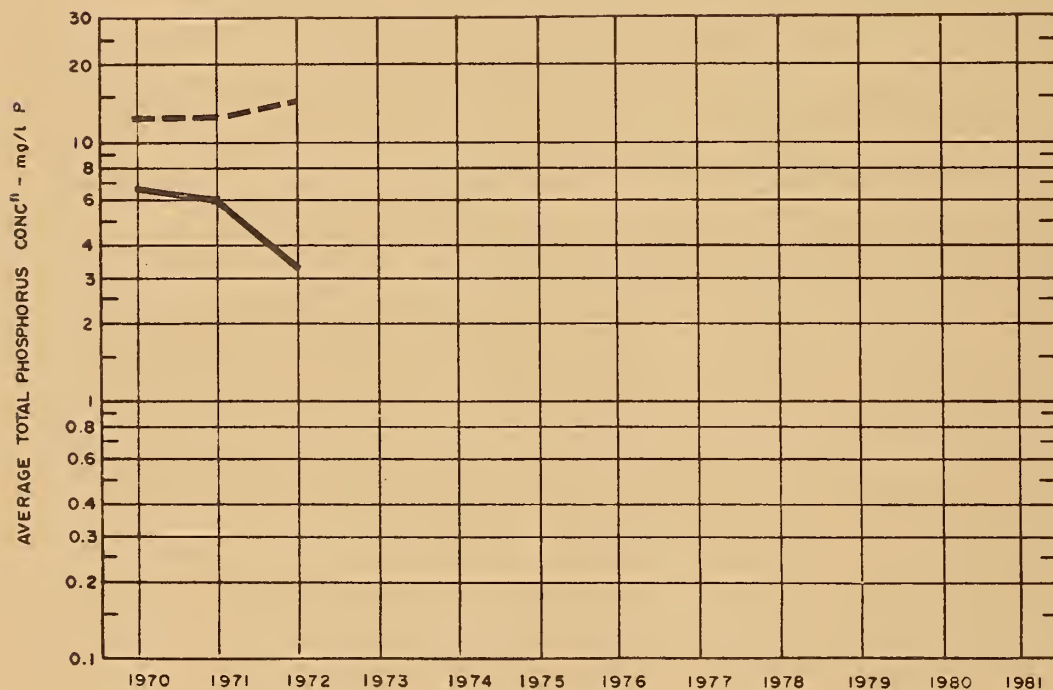
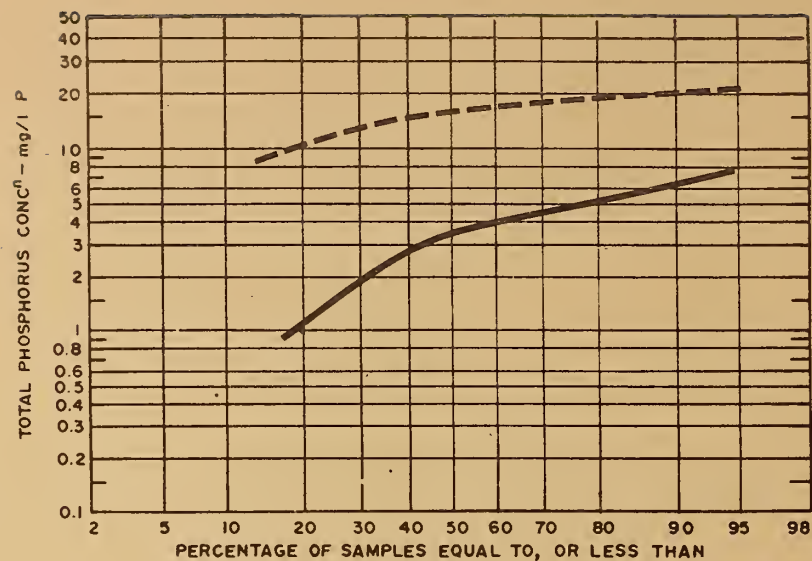
# SUSPENDED SOLIDS



PLANT INFLUENT      - - - - -  
 PRIMARY EFFLUENT      .....  
 PLANT EFFLUENT      \_\_\_\_\_



# PHOSPHORUS

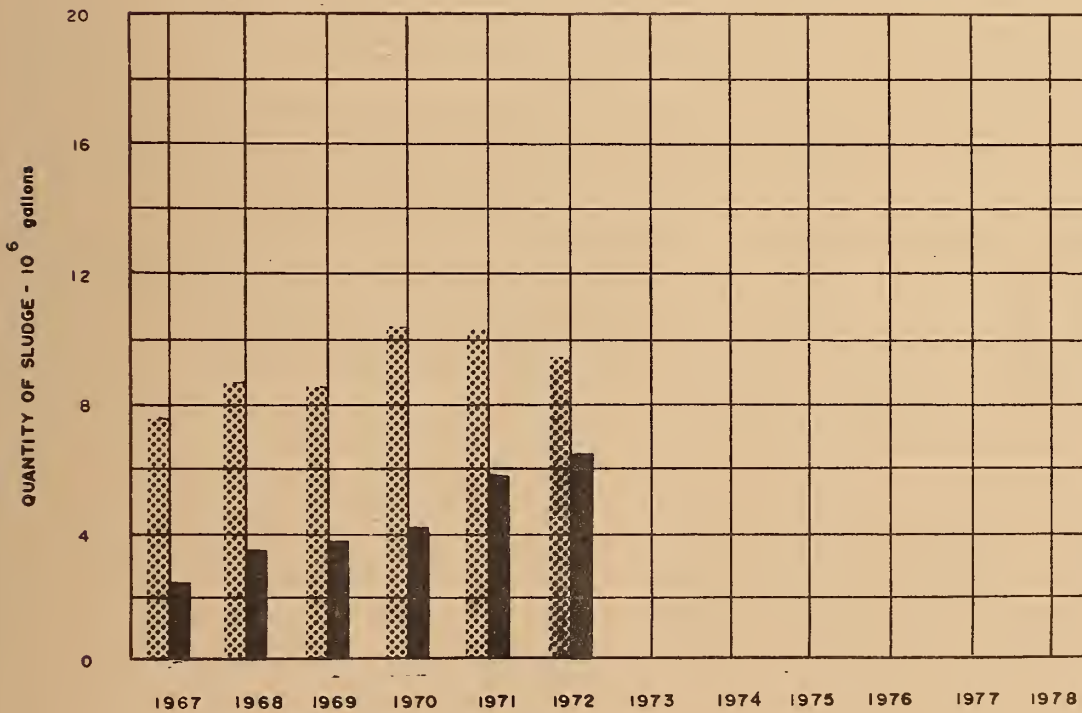
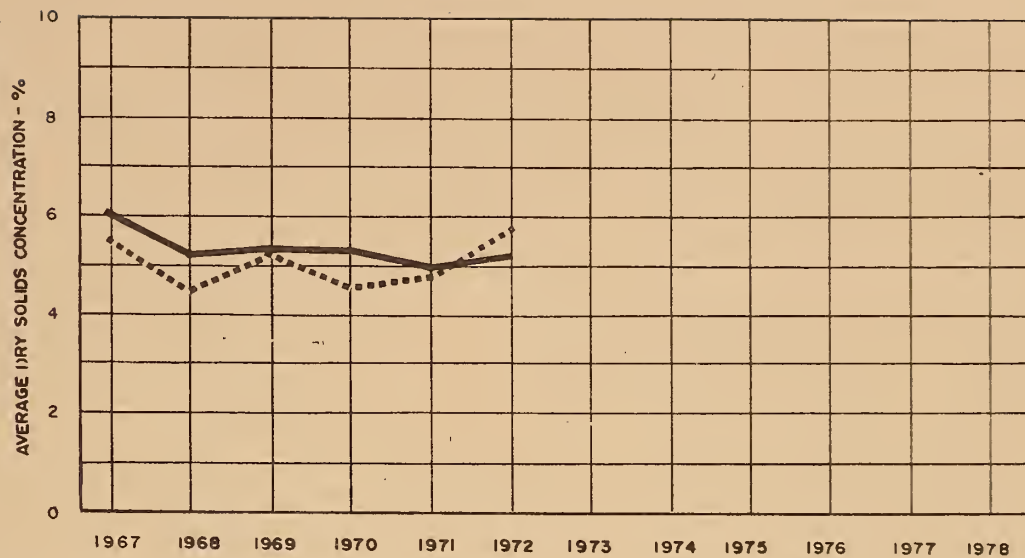


PLANT INFLUENT    - - - - -

PLANT EFFLUENT    —————

# DIGESTION

RAW SLUDGE .....  
DIGESTED SLUDGE ———



RAW SLUDGE TO DIGESTER

DIGESTED SLUDGE REMOVED

# TREATMENT DATA

MONTH	GRIT	CHLORINATION		PRIMARY EFFLUENT		AERATION			SLUDGE DIGESTION and DISPOSAL							
	QUANTITY REMOVED cubic feet	CL <sub>2</sub> USED 10 <sup>3</sup> pounds	AVG. DOSE mg/l	BOD mg/l	SUSPENDED SOLIDS mg/l	MLSS CONC mg/l	F/M day <sup>-1</sup>	AIR 1000 ft <sup>3</sup> lb BOD	RAW SLUDGE			DIGESTED SLUDGE			SUPER- NATANT T. S. %	AMOUNT HAULED cubic yards
									QUANTITY 10 <sup>3</sup> gallons	TOTAL SOLIDS %	VOL. SOLIDS %	QUANTITY 10 <sup>3</sup> gallons	TOTAL SOLIDS %	VOL. SOLIDS %		
JAN	159			124	106	1770	.13	2.0	861	4.1	50	505	5.2	40	1.1	2997
FEB	221			150	118	2010	.17	1.4	710	4.7	54	468	4.6	40	.2	2775
MAR	470			169	146	1750	.28	.9	917	7.0	49	531	6.3	37	1.3	3159
APR	225			125	117	2000	.23	1.4	809	6.6	51	445	5.2	39	1.7	2644
MAY	135	5.6	8.7	78	123	2000	.11	3.3	665	6.3	52	679	6.9	37	2.2	4037
JUNE	385	7.3	6.1	134	95	2000	.18	1.6	942	4.7	59	644	3.8	45	1.9	3824
JULY	308	4.5	3.9	8.	102	1840	.11	2.9	514	5.5	56	425	4.2	44	3.4	2519
AUG	383	4.5	4.1	55	121	2530	.05	4.0	517	6.1	55	377	4.7	40	1.0	2234
SEPT	884	5.4	3.3	129	169	3340	.14	1.2	967	5.5	46	461	5.7	36	2.3	2737
OCT	796	4.6	3.8	120	133	3160	.12	1.7	1195	6.6	44	705	4.4	39	4.5	4188
NOV	325			112	103	3320	.10	2.0	870	5.5	55	737	3.9	42	.9	4380
DEC	292			87	103	3470	.09	2.2	707	5.9	52	454	5.8	39	1.3	2682
TOTAL	4583	31.9	-	-	-	-	-	-	9674	-	-	6432	-	-	-	38176
AVG.	2.9 cu. ft/mil gal	5.3	5.0	121	119	2520	.14	2.0	806	5.7	5.2	536	5.1	40	1.8	3181

Chlorination period - May 15 to October 26



Date Due

Ontario. Ministry of the  
Environment. Projects  
Operation Branch.

TD 227/C43/W38/1972/MOE  
Chatham water pollution control  
plant.

1972 annual operating summary.

DATE	ISSUED TO
c.1	asjt

TD227/C43/W38/1972/MOE  
Ontario Ministry of the En  
Chatham water  
pollution control asjt  
c.1 a aa

Environment Ontario

Information Library  
Toronto, Ontario

Excluded from the MAP ONE

TD  
367  
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Chatham : water pollution  
control plant.  
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